

The effect of *pranayama* on test anxiety and test performance

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ABSTRACT

Objectives: In an educational setting, anxiety is often experienced by students when taking a test; which is called 'test anxiety'. This study intends to investigate the effect of doing *pranayama* on test anxiety and test performance.

Materials and Methods: The participants consisted of 107 MA students who were randomly assigned to the control and experimental groups. The students of the experimental group practiced *pranayama* for one full semester. Sarason's (1980) test anxiety scale was given to both the control and experimental groups in the final session, before taking the examination.

Results: After practicing *pranayama*, only 33% of the participants of the experimental group experienced high test anxiety, while this percentage was nearly twice in the control group (66.7%). Furthermore, the result of the *t-test* for test anxiety and test performance showed that the students of the experimental group had significantly lower mean test anxiety scores ($M = 16.00$) as compared to the students of the control group ($M = 19.31$). Also, the test performance scores of the experimental group were higher when compared with the control group. There was a negative correlation between the final test performance and test anxiety ($r = -.204, P < .05$).

Conclusions: *Pranayama* seems to have a significant positive effect on test anxiety and test performance. It could be used as an important technique by students prior to their examinations, to reduce their test anxiety and increase their test performance.

Key words: *Pranayama*; test anxiety; test performance.

INTRODUCTION

Today's ever-changing, technologically advanced, and competitive environment causes stress and anxiety in humans. Excessive and frequent anxiety can impair functioning. Anxiety can be defined as an uncomfortable emotional state in which one perceives danger, feels powerless, and experiences tension in preparing for an expected danger.^[1] Spielberger defines it as the subjective feeling of tension, apprehension, nervousness, and worry, associated with an arousal of the autonomic nervous system.^[2] In whichever way it is defined, the central characteristic of anxiety is worry, and it is clear that anxiety has a negative effect on all aspects, such as, social, personal, and academic performance.

Psychologists have distinguished several categories of

anxiety such as *trait*, *state*, and *situation-specific* anxiety. Trait anxiety is an aspect of personality and a more permanent disposition to be anxious. It is chronic and pervasive across situations and is not triggered by specific events,^[3] while state anxiety can be conceptualized as a response to a particular anxiety-provoking stimulus,^[2] in other words it has a clear trigger. State anxiety is experienced at a particular moment in time, as a response to a definite situation. More recently the term situation-specific anxiety has been used to emphasize the persistent and multifaceted nature of some anxieties.^[4] It is usually aroused at specific situations, such as public speaking anxiety.

Test anxiety, which is also the central idea of the present article, is defined by Spielberger and Sarason (1989) as a situation-specific trait that refers to the anxiety states and worry conditions that are experienced during an examination.^[5] Test anxiety, then, is a debilitating experience of anxiety during the preparation for a test or during the test itself.

The origin of test anxiety

As mentioned by Jing (2007), research on test anxiety

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has identified three models that explain the origin of test anxiety.^[6] In the first model the problem lies not in taking the test, but in preparing for the test. According to this model, which is identified as the learning-deficit model, students with high test anxiety tend to have or use inadequate learning or study skills, while preparing for their examination.^[6] The second model is termed as the interference model. This model postulates that during the test, students with test anxiety focus on task-irrelevant stimuli, which negatively affect the performance.^[7] This interference can be classified into physical distraction, and inappropriate cognition. Sweaty palms and muscle tension, and stating “I am stupid, I won’t pass” or “others are finishing before me,” are examples of physical distraction and inappropriate cognition. The third model of test anxiety includes people who think they have prepared adequately for a test, but in reality have not. These people question their abilities after the test, which creates anxiety during the next *test*. Whatever the origin of test anxiety, the teachers’ observation, students’ experience, and research results indicate that *test* anxiety affects the learning (e.g., foreign/second language) process negatively, which is explained in the next part.

The effects of test anxiety

Academic performance can be affected by a plethora of variables. Test anxiety is one of those variables, which in general, is expected to have a negative effect on the performance. Researchers^[6,8] have shown that test anxiety is negatively correlated with academic performance. Vogel and Collins (2008) have stated that the administration of quizzes arouses anxiety, which interferes with the performance; hence, planned quizzes are a better substitute, which lead to higher grades.^[9] The researchers believe that with planned quizzes, the participants will be able to study, which could counteract their anxiety level and bring it down to a more productive state.^[9] MacIntyre and Gardner (1991) have stated that test anxiety not only has a negative correlation with the language learning success, but it has also been positively correlated with low self-confidence.^[10] Low performance in speaking and writing tasks in the target language, poor language proficiency test performance, low grades in language classes, and in general low cognitive functioning, are all effects of test anxiety. Research gives proof of how anxiety can impact students in a very real and debilitating manner.^[11,12]

Yoga breathing exercises for energy and tranquility

Clinical studies support that yoga postures, mediation, and controlled breathing practices can alleviate stress and anxiety.^[13] Health experts have illustrated that after two months of practicing *pranayama* 56 medical students had reduced stress levels, as was evident by a decrease in total stress score, which was highly significant, at the start

of the study.^[14] In another research the level of anxiety of the senior citizens (60- to 70-year-old retired persons) decreased after three months of practicing *pranayama*.^[15] From literature it appears that practicing *pranayama* can reduce stress and anxiety in different groups.

The simple breathing techniques of *Pranayama* could offer agitated students concrete steps to calm themselves.^[16] Considering the problems caused by test anxiety in the context of the positive effects of *pranayama*, this study intends to answer the following research questions:

1. What is the level of test anxiety of the control and experimental groups after practicing *pranayama*?
2. What is the effect of practicing *pranayama* on the test anxiety of the experimental group in comparison to the control group?
3. What is the effect of practicing *pranayama* on the females’ / males’ test anxiety in the experimental group, in comparison to the females / males of the control group?
4. What is the effect of practicing *pranayama* on a foreign language test performance of the experimental group in comparison to the control group?
5. Does test anxiety affect foreign language test performance?

MATERIALS AND METHODS

Participants

The participants recruited in this research consist of 107 MA postgraduate Iranian students. They were selected based on the availability/convenience method. They were from two different disciplines of social science and Persian literature. The four intact groups were randomly selected as control and experimental groups. In all, there were two control ($N = 49$) and two experimental ($N = 58$) groups. Their age ranged from 29 to 43 years with the average of 27.91 and $SD = 6.23$. Within the sample, 32% ($N = 35$) of the participants were male and 67% ($N = 72$) were female.

Instruments

In this study, two instruments were utilized for data collection. The Sarason Anxiety Scale^[17] was used to measure the participants’ test anxiety, both at the beginning of the semester and at the end before the final examination. This questionnaire included 37 yes/no questions along with some demographic questions eliciting information such as, age, gender, and field of study added by the researcher. To eliminate misunderstanding, the translation of the questionnaire was given to the students. The reliability of the test, calculated by Cronbach alpha, was .79.

The second instrument was the final foreign language achievement *test* prepared by the researcher, based on

the materials covered during the term and the major of the participants. The test was conducted at the end of the academic year to measure the achievement of the students.

Procedure

The Sarason's test anxiety was given to the students in the first session. The first session explained yoga, its benefit, and the art of breathing or *pranayama*. The practical method of *pranayama* started from the second session in the class. The procedure was as follows:

In each session before the teaching phase (before starting the regular classes in the college), the teacher asked the students to sit quietly for one minute in their own places in the class. She asked the students to breathe deeply and easily. Meanwhile she also requested them to think that they were going to receive energy to the body and mind to become healthier, to become robust and strong. She asked them to think that they were going to throw all the impurities of the mind and the body through exhaling and think that they were going to have fresh and pure energy by inhaling fresh *Prana*, the breath fully filled with life, strength, positivism and energy. During this breathing technique the participants were asked to chant positive mantras such as, I can, I am able to do, I am successful, I am the best in the world, and so on. Then, with eyes closed, back erect, and mind relaxed, *pranayama* was started. It had three phases,

- **Phase 1: Slow inhale**, by taking a deep breath as deep as possible, very slowly and steadily, without hurrying up. The students were asked to visualize that the mind was taking energy into their body.
- **Phase 2: Hold**, by holding the breath as long as each student feels comfortable. During this time, the students were advised to think that the *prana* or energetic breath that they had taken in was cleansing the whole body from the top of the brain to the tip of leg. They were asked to imagine that the air was moving all over their body and cleansing all the organs and mind.
- **Phase 3: Slow exhale**, wherein the teacher asked the students to exhale slowly. The exhaling period was longer than the inhaling period. When exhaling, the students were asked to imagine that all the impurities of the body and mind were cleaned by letting the breath out of the body.

The above practices were repeated for one full semester. The duration of the practice was, however, different – devoting one to three minutes for each phase of practice in the beginning of the semester to 10 minutes at the end of the semester. In the final examination session, the first anxiety test was given to the students, followed by the foreign language test. The papers were corrected and the data was submitted to the SPSS software, for results and analysis.

For the control group no breathing practices were administered before the teaching phase (before starting the regular classes in the college).

Data analysis

To perform data analysis, the statistical package (SPSS) and the excel document were used. Further the analysis was specifically done using independent *t-tests* and correlation.

RESULTS

As shown in Table 1, there was no significant difference in anxiety between the student control and experimental groups at the beginning of the term.

1. What was the level of test anxiety in the control and experimental groups after practicing *pranayama*?

To answer the first research question, the Sarason's anxiety test scores were divided into three levels. Scores less than 12 were considered as low test anxiety scores, scores between 12 and 20 were medium, and scores of more than 20 were high test anxiety scores.

It was seen that 73% of the participants had low test anxiety, which was more than the percentage in the control group (26.3%) [Table 2]. Also, the percentage of medium test anxiety participants was higher in the experimental group (60 vs. 40%). Furthermore, due to practicing *pranayama*, 33% of the participants of the experimental group fell in the high test anxiety category, while this percent was nearly twice for the control group (66.7%). This shows the positive effect of practicing *pranayama* on lowering test anxiety.

2. What is the effect of practicing *pranayama* on the test anxiety of the experimental group in comparison to the control group?

A Levene test found that the assumption of homogeneity was met, $P = 0.173$. Therefore, an independent sample *t-test*, based on equal variances was calculated comparing the mean of the experimental group practicing *pranayama* with that of the control group not practicing *pranayama*.

From Table 3, it is clear that there is a significant difference between the two groups regarding test anxiety $t(105) = 3.27, P < 0.001$. In other words, the students of the experimental group had lower test anxiety ($M = 16.00$) compared to the students of the control group ($M = 19.31$).

3. What is the effect of practicing *pranayama* on females'/males' test anxiety in the experimental group in comparison to females/males of the control group?

In this research question, the researcher intended to

Table 1: Result of independent sample *t*-test between test anxiety of the control and experimental groups in pre-test

Groups	N	Mean	SD	T	Sig (Two-tailed)
Control	49	19.31	5.59	0.752	0.454
Experimental	58	18.48	5.68		

Table 2: Anxiety level of control and experimental groups

Anxiety level	Control (%)	Experimental (%)	Total (%)
Low	5 (26.3)	14 (73.7)	19 (100)
Medium	22 (40.4)	33 (60.0)	55 (100)
High	22 (66.7)	11 (33.3)	33 (100)
Total	49 (45.8)	58 (54.2)	107 (100)

Table 3: The result of the independent sample *t*-test between the test anxiety of the control and experimental groups

Groups	N	Mean	SD	T	Sig (Two-tailed)
Control	49	19.31	5.59	3.27	0.001
Experimental	58	16.00	4.81		

compare males and females of the control group and experimental group separately, with respect to their test anxiety.

It was seen that the test anxiety of the experimental group was lower as compared to that of the control group [Table 4]. As the results of the Levene test approved the assumption of the homogeneity of the two groups ($P = 0.121$ for the female group and $P = .659$ for males) a series of independent sample *t*-tests were used. Similarly, it was seen that both females and males of the experimental group had lower test anxiety. The results of the *t*-tests between females of the control and experimental groups, $t(105) = 2.51$, $P < 0.05$, as well as the males of the control and experimental groups, $t(105) = 2.24$, $P < 0.05$, showed the positive effect of practicing *pranayama* in decreasing test anxiety.

4. What is the effect of practicing *pranayama* on foreign language test performance of the experimental group in comparison to the control group?

To answer this research question regarding the effect of practicing *pranayama* on the final test performance, the scores of the final foreign language test were considered. The result of the Levene test approved the assumption of the homogeneity of the two groups $P = 0.342$, hence, a two-tailed independent sample *t*-test was carried out.

The results indicated that there was a significant difference in the test performance of the students of the control and experimental groups, $t(105) = 2.23$, $P < 0.05$ [Table 5]. It could be said that the test performance of the experimental group was higher when compared with the test performance of the control group ($M = 14.71$ vs. 13.70).

5. Does test anxiety affect foreign language test performance?

The last research question was answered by utilizing the correlation coefficient between test anxiety and final test performance.

The result of correlation showed that there was a negative correlation between the final test performance and test anxiety ($r = -.204$, $P < 0.05$) [Table 6]. This meant that the higher the test anxiety, the lower the test performance.

DISCUSSION

Feeling anxious at examination time is very common among students. Some students experience some level of stress when anticipating or taking an examination. A little nervousness is observed to help motivate the students; however, if the stress is too intense, it can affect the concentration during performance of the examination.^[18]

The first research question revealed that the level of test anxiety decreased at higher grades. In other words 33.3% of the participants in the experimental group had high test anxiety, while 66.7% of the participants in the control group had test anxiety, which was twice more than the experimental group. This meant that the practice of *pranayama* could reduce and control test anxiety.

From the second research question, it was seen that there was a significant difference between the test anxiety of the control and experimental groups. From the mean it was clear that the test anxiety of the experimental group was less than that of their counterpart.

Similarly there was a significant difference between the test anxiety of the males in the control and experimental groups, as well as females in the control and experimental groups; it was in favor of the experimental group.

The fourth research question dealt with language test performance. The result indicated that there was a significant difference in the test performance of the control and experimental groups. Due to practicing *pranayama*, the performance of the experimental group was higher when compared to the control group. The related literature on test anxiety in foreign language learning indicated that there were some factors that had an influence on student's reactions to language tests. These were, perceptions of test validity, time limit, test technique, test format, length, testing environment, and clarity of test instruction.^[19]

Finally, in this study it was revealed that there was a negative relationship between test anxiety and test performance. In other words, the higher the test anxiety,

Table 4: Result of the independent sample *t*-test between males/females of the control and experimental groups

Groups/females	N	Mean	SD	<i>t</i>	Sig (Two-tailed)
Control	28	19.50	5.91	2.51	0.014
Experimental	44	16.32	4.75		
Groups/males	N	Mean	SD	<i>t</i>	Sig (Two-tailed)
Control	21	19.50	5.27	2.24	0.032
Experimental	14	15.00	5.19		

Table 5: The result of the independent sample *t*-test between the foreign language test performance of the control and experimental groups

Groups	N	Mean	SD	<i>t</i>	Sig (Two-tailed)
Control	49	13.70	2.18	2.23	0.027
Experimental	58	14.71	2.44		

Table 6: The result of correlation between test anxiety and foreign language test performance

	Final test performance
Anxiety test pearson correlation	-0.204*
Sig. (2-tailed)	0.035
N	107

*Correlation is significant at the 0.05 level (Two-tailed)

the lower the test performance. From the first three research questions, the positive effect of practicing *pranayama* in lowering test anxiety has been seen. This can be justified by understanding the basic philosophy of doing *pranayama*. The purpose of yoga breathing exercise is to supply the body with oxygen and cleanse it of carbon dioxide and other toxins. Oxygen in blood is vital for:

- Assimilating the food we eat for fulfilling the body's various needs, like rebuilding tissues and supplying energy.
- Stimulating the functioning of the endocrine glands.
- Providing energy for functioning of the brain, nerves, heart, and other vital organs.
- Distribution of vital energy throughout the body.

But most people are unaware of the fact that the loss of energy/*prana* that is often felt in body is mostly due to incorrect breathing. Generally, one may be utilizing only a small portion of lung capacity. This inadequate supply of oxygen results in improper waste disposal from the body. The body functions are slowed down and the cells/tissues fail to regenerate themselves due to lack of sufficient energy. With *pranayama* practice one can increase the intake of oxygen up to five times. This means that one can get rid of five times of carbon dioxide out of the body. Students could imagine the improvement in the health and reducing anxiety by doing *pranayama*.

Affective factors can also have a strong influence on foreign language learning. As stated in^[20], a helpful way of conceptualizing that influence is to regard affect as a filter through which the foreign language input has to pass, before

it is acquired. When the feeling of the learner is positive, we may say that he / she is more open to input. His / her filter is clean and language passes easily through it.

A learner with a negative feeling, in this case test anxiety, will on the other hand be close to the input. This notion is called Krashen's input theory.^[21] In this study, better performance of the experimental group and negative correlation of test performance with anxiety were shown in the fourth and fifth research questions, respectively.

CONCLUSION

The significance of the *pranayama* technique mentioned in this study, is that it is readily available to everyone, every minute of every day. For students in anxious situations such as in-class tests, standardized examinations, final examinations, oral presentations, and so on, knowing this technique can be the difference between success and failure. For a nervous student or anyone who knows too well how anxiety manifests itself in the body and mind, the knowledge that something as simple as breathing differently can produce a different physical and mental response is quiet powerful. To know how to use the strength of one's own breath to calm and regulate anxiety is valuable information and something to consider when one work's with students who exhibit *test-taking* or language-related anxiety.^[16]

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